Results and Robustness Issues

Results

Shortrun Models. Table 4 presents results for both OLS and WLS regressions for models 1 and 2, the latter weighted by total personal income in the local market, a proxy for the size of the local economy. For all four regressions, the impact of deregulation is statistically significant and economically important (H1a). These results are consistent with those of J&S despite differences in the time period covered and in the level of aggregation. The significantly positive coefficients on *DMA* indicate that geographic deregulation has benefited the nonmetropolitan markets. However, the nonmetropolitan impact of deregulation is only one-half (OLS) to two-thirds (WLS) the magnitude of the metropolitan impact. For all four regressions, the addition of *HHI* has negligible effect on the coefficient of *DMA* (H2a). The coefficient of *HHI* is significantly negative (H2b), indicating that more concentrated banking markets are associated with slower growth in real per capita personal income on average. This result is consistent with previous research on bank market performance and concentration described above.

For comparison, J&S estimated model 1 with 1,015 State-level observations from 1972-92. Their estimates of *DMA* were 0.0094 (OLS) and 0.0119 (WLS), both statistically significant at the 1-percent level. Thus, our results are quantitatively and qualitatively similar to earlier findings, but indicate a proportionally greater impact on metropolitan than on nonmetropolitan areas. This conclusion holds both in absolute and relative terms. Over the period covered by our data, 1981-96, real per capita personal income grew at an average annual rate of 1.43 percent in metropolitan markets and 1.58 percent in nonmetropolitan markets. Our results suggest that geographic liberalization was associated with an average increase in expected growth of 59 to 87 percent in metropolitan markets and of 28 to 53 percent in nonmetropolitan markets.

Table 4—Estimates from shortrun models 1 and 2[1]

Real per capita income growth, 1980-96

	Weighted by total personal income				Unweighted			
	Metro		Nonmetro		Metro		Nonmetro	
Obs.	4,539		38,046		4,539		38,046	
Adj. R^2	.5859	.5866	.1876	.1877	.4330	.4336	.1333	.1334
DMA	0.0124 (15.26)*	0.0125 (15.31)*	0.0084 (11.09)*	0.0084 (11.11)*	0.0085 (8.42)*	0.0086 (8.48)*	0.0044 (3.48)*	0.0045 (3.49)*
HHI		–0.0138 (–2.78)*		–0.0031 (–2.11)**		–0.0112 (–2.43)**		–0.0035 (–2.02)**

Real per capita income growth, 1980-96

	Weighted by total personal income		Unweighted	
	Farm-dependent		Farm-dependent	
Obs.	8,848		8,848	
Adj. R^2	.1154	.1157	.1129	.1133
DMA	–0.0081 (–2.38)**	–0.0081 (–2.38)**	–0.0107 (–2.47)**	–0.0107 (–2.47)**
HHI		–0.0098 (–2.02)**		–0.0105 (–2.15)**

T-statistics appear in parentheses.
Two-tailed significance levels:
* significant at 1 percent (t > 2.550)
** significant at 5 percent (2.550 > t > 1.960)

[1] For comparison, Jayaratne and Strahan estimated model 1 with 1,015 State-level observations from 1972-92 using both ordinary least squares and weighted least squares. Their OLS estimate of DMA was 0.0094 (3.62*) with an adjusted R^2 of 0.49. Their WLS estimate of DMA was 0.0119 (4.96*) with an adjusted R^2 of 0.70.

The estimates from model 3 are presented in table 5 and results of hypotheses tests are presented in table 6. For brevity, we report only weighted results (unweighted results are available from the authors). Consistent with results from models 1 and 2, the coefficients related to geographic liberalization remain positive, statistically significant and economically important. Coincidentally, the coefficients on DNOVO and DMA in model 3 roughly sum to the coefficients on DMA from models 1 and 2, suggesting that the effect of liberalization can be decomposed into effects from consolidations through holding company acquisitions and mergers and from *de novo* branching. The ratio of the impact of each stage of liberalization is similar in nonmetro areas versus metro areas, with nonmetro areas experiencing about two-thirds the increase in growth experienced in metro areas.

The fact that these coefficients remain significant and of comparable magnitudes across models 1, 2, and 3 indicates that changes in market structure and local bank ownership or local deposit control are not the important avenues through which geographic liberalization affects local growth. At a minimum, these findings may mitigate concerns that shifts toward nonlocal ownership of local bank offices or nonlocal control of local deposits might adversely affect local economic performance. Statistical hypothesis tests indicate that bank office numbers, bank deposits, and deposit market concentration jointly have a statistically significant association (at the 1-percent confidence level) with local economic growth (H3a) in both metro and nonmetro markets. Individually, deposit market concentration maintains its statistically significant negative association (at the 5-percent confidence level) with local economic growth (H3b) in metro but not in nonmetro markets. F tests indicate that the number of bank offices (H3c) and the amount of bank deposits (H3d) are significantly related to economic growth in nonmetro areas only, but there is no evidence that differences in the locus of ownership of bank offices (H3e) or control of bank deposits (H3f) affect these associations. There is, however, weak evidence (statistically significant at the 10-percent confidence level) that local growth in metropolitan markets is more negatively associated with out-of-market bank office ownership than in-market ownership (H3e). Despite the statistical significance of coefficients (especially in nonmetro markets) related to the number of bank offices (NIB and NXB) or amount of local deposits (IDEPS and XDEPS), the economic significance of these associations is small and offsetting.

Longrun Model. The estimates from models 4 are shown in table 7 and results of hypothesis tests are presented in table 8. In each case, the hypothesis that longrun average per capita income growth is independent of initial bank market structure is rejected (H4a), with greater statistical significance for both markets in the later period.

The initial number of bank offices owned in-market (NIB) is positively and significantly associated with subsequent growth rates in real per capita income for the period 1984-96 in both rural and urban markets. In the earlier period, these associations are negative but not significantly so. The initial number of bank offices owned out-of-market (NXB) is positively and significantly associated with subsequent growth in rural markets for 1984-96, but is otherwise not statistically significant. This shift is consistent with the overbanking hypothesis in the 1970's and early 1980's, but is consistent in rural markets for the later period with other empirical findings that more banks are associated with faster economic growth rates (see

Table 5—Estimates from shortrun model 3

	Real per capita income growth (weighted by total personal income)		
	Metro	Nonmetro	Farm-dependent counties
Obs.	4,272	36,128	8,847
Adj. R2	.5705	.1405	.1160
NIB	2.5E-7	1.8E-4	4.0E-4
	(0.14)	(3.12)*	(0.68)
NXB	–9.0E-6	2.1E-4	3.4E-4
	(–1.84)***	(2.24)**	(0.44)
IDEPS	6.6E-8	–7.5E-6	–6.7E-5
	(1.89)***	(–2.94)*	(–1.79)***
XDEPS	–1.3E-7	–1.5E-5	–2.2E-6
	(–1.06)	(–2.95)*	(–0.08)
DNOVO	0.0020	0.0014	0.0068
	(2.06)**	(1.70)***	(1.50)
DMA	0.0102	0.0074	–0.0120
	(9.78)*	(8.92)*	(–2.91)*
HHI	–0.0120	–0.0024	–0.0129
	(–2.34)**	(–1.37)	(–2.12)**

T-statistic in parentheses.
Two-tailed significance levels:
* significant at 1 percent (t > 2.550)
** significant at 5 percent (2.550 > t > 1.960)
***significant at 10 percent (1.960 > t > 1.645)

Table 6—Hypothesis tests from weighted regressions for shortrun models

(1) $Y_{t,i} / Y_{t-1,i} = \alpha_t + \beta_i + \gamma DMA_{t,i} + e_{t,i}$,

(2) $Y_{t,i} / Y_{t-1,i} = \alpha_t + \beta_i + \gamma_1 DMA_{t,i} + \delta HHI_{t,i} + e_{t,i}$, and

(3) $Y_{t,i} / Y_{t-1,i} = \alpha_t + \beta_i + \gamma_1 DMA_{t,i} + \gamma_2 DNOVO_{t,i} + \delta_1 HHI_{t,i} + \delta_2 NIB_{t,i} + \delta_3 NXB_{t,i} + \delta_4 IDEPS_{t,i} + \delta_5 XDEPS_{t,i} + e_{t,i}$

Hypothesis: *Local growth is independent of--*		Metro	Nonmetro	Farm-dependent
H1a: *Deregulation*	$\gamma = 0$	t=15.26*	t=11.09*	t=–2.38**
H2a: *Deregulation*	$\gamma = 0$	t=15.31*	t=11.11*	t=–2.38**
H2b: *Market concentration*	$\delta = 0$	t=–2.78*	t=–2.11**	t=–2.02**
H3a: *Bank ownership and market structure*	$\delta_{1,j} = \delta_{2,j} = \delta_{3,j} = \delta_{4,j} = \delta_{5,j} = 0$	F=23.23*	F=5.05*	F=1.26
H3b: *Concentration*	$\delta_{1,j} = 0$	t=–2.34**	t=–1.37	t=–2.12**
H3c: *Office ownership*	$\delta_{2,j} = \delta_{3,j} = 0$	F=1.71	F=6.98*	F=0.34
H3d: *Deposit control*	$\delta_{4,j} = \delta_{5,j} = 0$	F=2.11	F=9.01*	F=1.65
H3e: *Office ownership differences*	$\delta_{1,j} = \delta_{2,j}$	F=2.87***	F=0.06	F=0.00
H3f: *Deposit control differences*	$\delta_{4,j} = \delta_{5,j}$	F=2.22	F=1.78	F=1.59

Two-tailed significance levels:
* statistically significant at 1 percent
** statistically significant at 5 percent
***statistically significant at 10 percent

King and Levine, 1993a and 1993b; Jayaratne and Strahan, 1996; Krol and Svorny, 1996; Levine, 1998; Rajan and Zingales, 1998; Shaffer, 1998).

The coefficients on NIB and NXB together indicate that intramarket banking consolidation may be harmful to the economic growth of local markets in today's environment. However, the coefficients on the initial measure of bank deposit market concentration (HHI) do not consistently support this conclusion (H4b). For rural banking markets, the coefficient on HHI is insignificant in both periods. For urban markets, the coefficient on HHI is significantly negative in the earlier period and significantly positive in the later period. The lack of significance in rural markets may relate to the fact that bank deposit market concentration for over 90 percent of rural banking markets exceeds the Justice Department's guidelines of 0.1800 throughout the period.

The association between longrun average growth and the initial number of bank offices strengthens over time (H4c) for both metropolitan and nonmetropolitan markets. In the earlier period, the null hypothesis of no association is rejected for neither case, but a strong association exists in the later period, especially for nonmetropolitan markets. A change over time also occurs with respect to in-market and out-of-market ownership of bank offices (H4e). The hypothesis that the association between longrun average growth and bank offices does not differ by locus of ownership (in-market or out-of-market) is weakly rejected for nonmetropolitan markets in the earlier period and for metropolitan markets in the later period. Interestingly, this test becomes insignificant for nonmetropolitan markets in the later period. These results indicate greater cause for concern about bank ownership patterns in metropolitan areas than in nonmetropolitan areas, although the magnitudes of the coefficients indicate very small potential impact on metropolitan growth.

The coefficients on NIB and NXB must be interpreted jointly with the initial mix of local versus nonlocal bank offices (XTB) in this model, since XTB represents a nonlinear interaction between NIB and NXB. The coefficient on XTB (H4d) is negative in all but one case, and statistically significant for rural markets in the earlier period (at the 1-percent confidence level) and for urban markets in the later period (at the 5-percent confidence level). The coefficients on XTB should be interpreted as the association between per capita income growth and the share of out-of-market bank offices, holding the total number of banks constant. A joint calculation involving the estimated coefficients on NIB, NXB, and XTB indicates that, at the sample mean values of these variables, the point estimate of the subsequent average decrease in real per capita income growth associated with bank

offices owned out-of-market in metropolitan markets in 1984 is 0.09 percentage points per year, or 6 percent of the expected average annual growth over the subsequent 12 years.

To this point, we have examined results relating initial conditions to subsequent longrun average growth. Now, we turn to contemporaneous associations between bank ownership structure and deposit control and growth. The model contains two types of contemporaneous measures. The first is the growth rate in the ratio of bank offices owned in-market (DIB) or out-of-market (DXB). The second is the change in the local deposit market share controlled by banks owned out-of-market (DDEP). Both DIB and DXB are positively and significantly associated with income growth in the rural regressions for both periods. In urban markets, DIB is significant and negative in the earlier period and insignificant in the later period, while DXB is significant and negative in the

Table 7—Estimates from longrun model 4

	Real per capita personal income growth (weighted by total personal income)					
Sample	Metro		Nonmetro		Farm-dependent	
Time period	1973-84	1984-96	1973-84	1984-96	1973-84	1984-96
Obs.	260	264	2,265	2,265	555	554
Adj. R^2	.3107	.3058	.5223	.2434	.5748	.3842
INTERCEPT	.0514 (4.58*)	.0442 (4.36*)	0.0721 (11.51*)	0.0829 (13.95*)	0.1690 (9.71*)	0.0893 (6.00*)
NIB	–1.54E-6 (–0.30)	4.21E-6 (3.09*)	–4.28E-5 (–0.86)	2.33E-4 (5.85*)	0.0010 (4.02*)	1.70E-4 (0.80)
NXB	8.36E-6 (0.48)	–9.58E-6 (–1.53)	1.26E-4 (1.46)	2.09E-4 (4.36*)	9.32E-4 (2.64*)	–0.0012 (–4.45*)
XTB	–.0037 (–1.56)	–.0044 (–2.29**)	–0.0035 (–3.21*)	0.0011 (1.18)	–0.0028 (–1.09)	0.0011 (0.46)
DDEP	.0056 (2.43**)	–.0028 (–1.85***)	–7.34E-4 (–0.59)	2.20E-4 (0.28)	–0.0056 (–1.22)	–0.0013 (–0.58)
DIB	–6.1E-5 (–2.63*)	1.11E-5 (0.56)	8.64E-5 (1.76***)	5.74E-4 (4.54*)	7.02E-4 (3.53*)	2.95E-4 (0.64)
DXB	4.53E-7 (0.18)	–4.27E-6 (–3.08*)	2.65E-5 (2.19**)	2.06E-5 (2.52**)	–1.78E-5 (–0.11)	7.60E-7 (0.02)
LPOP	.0017 (2.78*)	0.0011 (2.35**)	0.0025 (5.43*)	–9.91E-4 (–2.23**)	–0.0039 (–2.87*)	0.0012 (1.04)
LEDU	.0088 (6.62*)	0.0032 (2.15**)	0.0041 (8.01*)	0.0039 (7.65*)	0.0061 (3.60*)	4.60E-4 (0.26)
LRPCI	–.0187 (–5.70*)	–0.0150 (–4.46*)	–0.036719 (–31.44*)	–0.0234 (–19.69*)	–0.0573 (–24.80*)	–0.0388 (–14.05*)
DPC	.0014 (2.36**)	–0.0004 (–2.29**)	0.001254 (4.14*)	–9.77E-5 (–1.06)	0.0030 (4.46*)	5.81E-4 (3.31*)
HHI	–.0112 (–2.81*)	0.0133 (3.09*)	–0.000851 (–0.64)	–0.0011 (–0.79)	–1.22E-4 (–0.03)	–0.0087 (–3.00*)
FM			–0.006594 (–10.05*)	–0.0022 (–3.63*)		
MI			0.002956 (3.64*)	–0.0066 (–9.65*)		

T-statistic in parentheses.
Two-tailed significance levels:
* significant at 1 percent
** significant at 5 percent
***significant at 10 percent

later period but insignificant in the earlier period. For rural markets, the hypothesis that these two variables have equal coefficients (H4f) is rejected in the later period but not in the earlier period. For urban markets, the reverse holds—the hypothesis is rejected for the earlier but not the later period.

Since both DIB and DXB measure contemporaneous changes in the presence of bank offices owned in-market and out-of-market, they cannot reveal information about causal links between the structure of financial intermediation and local economic growth. Banks may expand or contract their local office numbers in response to a number of factors including past local growth, anticipated local growth, changes in the local competitive environment, and changes in banking regulations. During the period of interest rate ceilings on bank deposits that ended in the early 1980's, banks were forced to compete through non-price mechanisms, including convenient office locations. With this in mind, the significantly negative coefficients for the urban regressions are striking, and may be consistent with the overbanking hypothesis: the numbers of banks either declined in the fastest-growing cities (suggesting initial overbanking in those communities) or grew in economically declining cities (suggesting a trend toward overbanking in those MSA's), or both. As banks with large branching networks began consolidating in the 1980's—a process that increased the number of banks owned out-of-market—they also began rationalizing their branching networks by closing redundant branches (Frydl, 1993; Edwards, 1996).

Similarly, the contemporaneous change in the share of deposits controlled by banks owned out-of-market

Table 8—Hypothesis tests from weighted regressions for longrun model

$$(4)\quad \overline{GY}_{t_T,t_0} = \alpha + \beta_1 NIB_{t_0} + \beta_2 NXB_{t_0} + \beta_3 XTB_{t_T,t_0} + \beta_4 DIB_{t_T,t_0} + \beta_5 DXB_{t_T,t_0} + \beta_6 DDEP_{t_T,t_0} + \gamma_1 DPC_{t_0} + \gamma_2 LEDU_{t_0} + \gamma_3 LPOP_{t_0} + \gamma_4 LRPCPI_{t_0} + \gamma_5 HHI_{t_0} + e$$

Hypothesis:	1973-84			1984-96		
Local growth is independent of--	Metro	Nonmetro	Farm dependent	Metro	Nonmetro	Farm dependent
H4a: *Initial local bank market structure* $\beta_{1,j} = \beta_{2,j} = \beta_{3,j} = \gamma_{5,j} = 0$	F=3.77*	F=3.24**	F=5.58*	F=8.96*	F=13.56*	F=16.72*
H4b: *Initial deposit market concentration* $\gamma_{5,j} = 0$	t= –2.81*	t= –0.64	t= –0.03	t=3.09*	t=–0.79	t= –3.00*
H4c: *Initial number of local bank offices* $\beta_{1,j} = \beta_{2,j} = 0$	F=0.17	F=1.58	F=9.39*	F=4.95*	F=24.68*	F=12.23*
H4d: *Initial percent of out-of-market ownership* $\beta_{3,j} = 0$	t=–1.56	t=–3.21*	t=–1.09	t=–2.29**	t=1.18	t=0.46
H4e: *Initial locus of ownership of bank offices* $\beta_{1,j} = \beta_{2,j}$	F=0.30	F=3.14***	F=0.06	F=4.09**	F=0.16	F=22.22*
H4f: *Contemporaneous shift in locus of ownership of bank offices* $\beta_{4,j} = \beta_{5,j}$	F=6.95*	F=1.46	F=7.67*	F=0.61	F=20.48*	F=0.45
H4g: *Contemporaneous shift in locus of control of local bank deposits* $\beta_{6,j} = 0$	t=2.43**	t=–0.59	t=–1.22	t=–1.85***	t=0.28	t=–0.59

Two-tailed significance levels:
* statistically significant at 1 percent
** statistically significant at 5 percent
***statistically significant at 10 percent

(DDEP) cannot be interpreted as providing information on the direction of causality. DDEP is not significantly related to longrun average growth (H4g) in rural markets in either period, but has a significantly positive coefficient for urban markets in the earlier period and a significantly negative coefficient in the later period. These results are consistent with results from the shortrun model 3, indicating no significant difference in the association between growth and control of deposits (H3f) in rural markets.[8] The lack of significance of either hypothesis related to control of local deposits indicates that nonlocal banks do not retard growth in rural areas (such as by exporting deposits to other localities) any more than local banks do.

Changes in the coefficients on NIB, NXB, XTB, and DDEP over time are consistent with an increasingly negative relationship between longrun growth and nonlocal ownership in metropolitan markets and an increasingly positive relationship between longrun growth and nonlocal ownership in nonmetropolitan markets. While the negative, statistically significant coefficient on XTB is consistent with a negative relationship between nonlocal control in rural areas and longrun average growth rates in local real per capita income in the earlier period, the more recent evidence is consistent with evidence from shortrun models that, on average, no harm and some benefits may accrue from geographic liberalization and entry by out-of-market owned firms.

Farm-Dependent Counties. Much of the concern about nonlocal bank ownership has agrarian roots and much of the research on the impact of bank consolidation has focused on agricultural lending. To shed further light on whether farm areas are affected differently by geographic liberalization and nonlocal bank ownership or deposit control, we reestimate models 1 through 4 for farm-dependent rural counties. USDA defines counties as farm-dependent if farm income averages more than 20 percent of total income from 1987 to 1989. Results from this estimation are presented alongside other results in tables 4 through 8.

[8]Given the difference in time periods, the weak significance in the later period and the change in sign between the two periods, the results of the longrun model for metropolitan markets is also consistent with those from the shortrun model.

Over the 1981-96 period, real per capita personal income grew in farm-dependent markets by 2.16 percent on average each year. Results from models 1 and 2 suggest that on average geographic liberalization was associated with a decrease in expected growth of 37 to 50 percent in these markets.

The results differ in striking ways from those for other rural or urban banking markets, lend support to Calomiris's wealth insurance hypothesis, and suggest that an empirical basis may exist for agrarian misgivings about liberalization. In contrast to other rural markets, results from the shortrun models indicate that reduced growth is associated with geographic liberalization in farm-dependent markets (H1a and H1b). In addition, the negative association between deposit market concentration and growth is stronger in farm-dependent markets than in other rural markets (H2b and H3b). Each of these results is statistically significant at the 5-percent confidence level. As in other rural markets, there is no evidence that the locus of ownership of local bank offices or the locus of deposit control affects shortrun growth rates.

The longrun model enriches these results, indicating a relatively large, negative, and statistically significant association between the initial number of bank offices owned out-of-market and subsequent longrun average income growth from 1984-96. In this period, the hypothesis that the association between local growth and bank office numbers is invariant to the locus of ownership of bank offices (H4e) is soundly rejected. Initial deposit market concentration also has a relatively large, negative, and statistically significant association with longrun average income growth in this period. Interestingly, initial market concentration was not significantly related to longrun average growth in the 1973-84 period. Given that the earlier period generally coincides with a time of prosperity in U.S. agriculture and that the latter period starts near the trough of the agricultural recession of the 1980's, these results may indicate substantial differences in the commitment of nonlocal banks to local areas consistent with Calomiris (1993).

Robustness Issues

The empirical models in this paper are susceptible to several criticisms related to spurious causality or omitted variables. These issues can be addressed by controlling for other plausible contemporaneous changes or business cycle effects. The possibility of reverse causality is usually addressed by considering

lagged independent variables in the shortrun context, or initial as opposed to contemporaneous independent variables in the longrun context. For example, J&S present evidence that geographic deregulation did not coincide with growth-enhancing policy changes at the State level and that States tended to liberalize at the trough of a recession. These results are applicable to the research here as well since decisions to deregulate as well as many important macro policies are determined at the State level. Unfortunately, uniform information on plausible local growth policies is not readily available, so we are unable to conduct similar tests at the local level. J&S also estimate their model with three lags of the dependent variable to control for the State-level business cycle, finding coefficients on DMA that were smaller in magnitude but still economically and statistically significant.

We address the possibility of reverse causality (that is, that bank market structure and ownership reflect banks' anticipation of local growth) by reestimating shortrun model 3 with lags of the independent variables related to bank ownership and market structure. Results in tables 9 and 10 indicate greater levels of statistical significance for lagged variables and associated hypotheses than for their contemporaneous counterparts in tables 5 and 6. It is unlikely that the linkage between income growth and these lagged variables represents reverse causality, although the possibility of joint causality or omitted variables cannot be entirely dismissed.

It is even less likely that the variables representing initial conditions in the longrun model 4 reflect reverse causality (i.e., that subsequent income growth rates influence the *ex ante* banking structure). Although banks, like other businesses, have a financial incentive to try to predict and adapt to future market conditions, accurate forecasts are very difficult and rarely attained, particularly over horizons in excess of 10 years as measured by our growth vari-

Table 9—Estimates of shortrun model 3 with lagged independent variables

	Real per capita income growth (weighted by total personal income)		
Sample	Metro	Nonmetro	Farm-dependent
Obs.	4272	36128	8848
Adj. R2	.5681	.1419	.1160
NIBt-1	5.5E-6 (3.12)*	4.4E-4 (6.45)*	5.1E-4 (0.87)
NXBt-1	–1.3E-5 (–2.68)*	3.6E-4 (3.75)*	–6.3E-5 (–0.08)
IDEPSt-1	–8.0E-8 (–2.34)**	–2.2E-5 (–6.50)*	–7.6E-5 (–2.03)**
XDEPSt-1	–5.0E-8 (–0.40)	–2.7E-5 (–5.08)*	6.1E-6 (0.21)
DNOVO	0.0027 (2.75)*	0.0014 (1.76)***	0.0069 (1.53)
DMA	0.0100 (9.50)*	0.0071 (8.51)*	–0.0120 (–2.92)*
HHI	–0.0135 (–2.63)*	–0.0024 (–1.38)	–0.0137 (–2.27)**

T-statistics in parentheses.
Two-tailed significance levels:
* significant at 1 percent (t > 2.550)
** significant at 5 percent (t > 1.960)
*** significant at 10 percent (t > 1.645)

Table 10—Hypothesis tests from weighted regressions for shortrun model 3 with lagged independent variables

(3) $Y_{t,i} / Y_{t-1,i} = \alpha_t + \beta_i + \gamma_1 DMA_{t,i} + \gamma_2 DNOVO_{t,i} + \delta_1 HHI_{t-1,i} + \delta_2 NIB_{t-1,i} + \delta_3 NXB_{t-1,i} + \delta_4 IDEPS_{t-1,i} + \delta_5 XDEPS_{t-1,i} + e_{t,i}$

Hypothesis: *Local growth is independent of--*		Metro	Nonmetro	Farm-dependent
H3a: *Bank ownership and market structure*	$\delta_{1,j} = \delta_{2,j} = \delta_{3,j} = \delta_{4,j} = \delta_{5,j} = 0$	F=22.74*	F=19.30*	F=1.27
H3b: *Concentration*	$\delta_{1,j} = 0$	t=–2.63*	t=–1.38	t=–2.27**
H3c: *Office ownership*	$\delta_{2,j} = \delta_{3,j} = 0$	F=7.01*	F=26.89*	F=0.38
H3d: *Deposit control*	$\delta_{4,j} = \delta_{5,j} = 0$	F=3.04**	F=35.54*	F=2.16
H3e: *Office ownership differences*	$\delta_{2,j} = \delta_{3,j}$	F=11.31*	F=0.52	F=0.33
H3f: *Deposit control differences*	$\delta_{4,j} = \delta_{5,j}$	F=0.05	F=0.74	F=2.60

Two-tailed significance levels:
* statistically significant at 1 percent
** statistically significant at 5 percent

ables. Moreover, the economic growth rates exhibit virtually no persistence from one decade to another for the average market in our sample. The Pearson correlation coefficients between the growth rate of income over 1973-84 and that over 1984-96 are not significantly different from zero and are actually slightly negative: -0.021 and -0.101 for the rural and urban samples, respectively. Thus, simple extrapolation from historical economic growth rates would not have permitted banks to foresee accurately the future growth rates in the average U.S. market. Furthermore, growth in per capita income does not necessarily indicate overall market growth or an attractive market for bank entry; it is quite possible to experience growing per capita income even in a market with declining population. Finally, changes in bank structure over the sample period are controlled for as separate regressors that should capture any response by the banking industry to local market conditions.

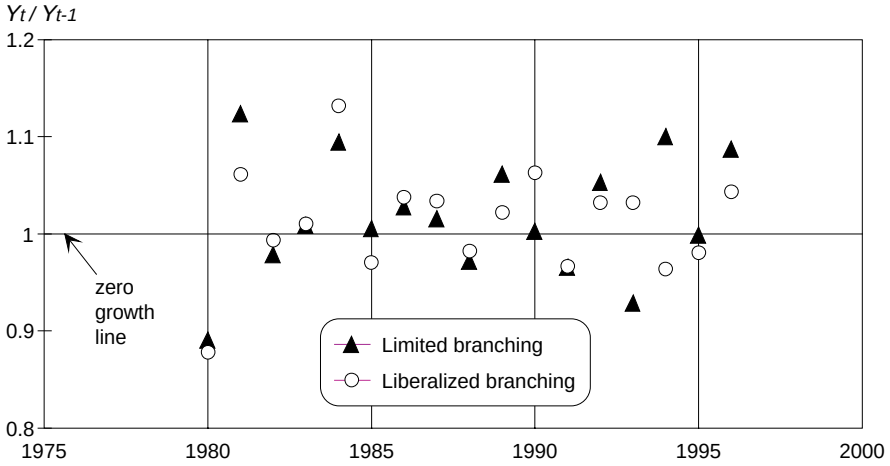
Perhaps the most plausible argument that these results reflect omitted variables or joint causality can be made for shortrun models 1 and 2, especially for farm-dependent counties. After all, many States liberalized geographic restrictions because of the wave of bank failures related to the agricultural recession of the 1980's. These States might have liberalized in a period when their farm economies continued to underperform. Figure 2 presents some informal evidence with respect to this possibility. During the height of the farm recession (roughly 1984-88) farm-dependent counties with liberalized branching rules outperformed those with limited branching in every year except 1985. Ironically, farm-dependent counties with liberalized branching perform less well than those with limited branching in relatively stable or prosperous periods. Another way to control for the effect of local business cycles is to add lagged dependent variables to the model. Table 11 shows that doing so weakens the magnitudes of the coefficients for metro and farm-dependent markets but substantially increases their magnitudes for nonmetro markets. In addition, the negative relationship between liberalization and growth in farm-dependent markets loses its statistical significance, indicating that the farm business cycle may indeed be an important confounding influence in these counties.

Table 11—Estimates of shortrun model 2 with three lags of dependent variable

	Real per capita income growth, 1980-1996 Weighted by total personal income		
	Metro	Nonmetro	Farm-dependent
Obs.	3,738	31,612	7,770
Adj. R2	.5837	.1908	.2523
DMA	0.0103 (10.98)*	0.0131 (16.70)*	–0.0048 (–1.46)
HHI	–0.0039 (–0.76)	–0.0021 (–1.43)	–0.0063 (–1.39)

T-statistics in parentheses.
Two-tailed significance levels:
* significant at 1 percent

Figure 2
Bank branching restrictions and real per capita income growth in farm-dependent rural counties, 1980-96



Vertical axis indicates 1+ real growth in per capita personal income. Therefore, a level of 1 on the vertical axis indicates zero real growth, below 1 indicates a decline, and above 1 indicates an increase over the previous year.